Journal of Analytical Chemistry 2012 vol.67 N8, pages 714-721

Computer simulation of two-step atomization in graphite furnaces for analytical atomic spectrometry

Zakharov Y., Kokorina O., Lysogorskii Y., Staroverov A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

The processes of sample fractionation by two-step atomization with the intermediate condensation of the analyte on a cold surface in graphite furnaces were theoretically studied. The transfer equation was solved for the atoms, molecules, and condensed particles of the sample from a flow of argon directed along this surface. The spatial distributions of vapor and the condensate formed were calculated depending on the composition and flow rate. It was found that a cold surface section with a length of 6 mm is sufficient for the complete trapping of atomic analyte vapor from an argon layer having a velocity of about 1 m/sec and a thickness of 5 mm. In this case, the molecules and clusters condensation coefficients smaller than unity were deposited insignificantly; that is, they were fractionally separated. The results of the shadow spectral visualization of the process of sample fractionation on a cold probe surface of in commercial HGA and THGA atomizers were interpreted. The advantages of analytical signals upon the evaporation of a sample condensate from the probe in these atomizers and inductively coupled plasma were demonstrated. © 2012 Pleiades Publishing, Inc.

http://dx.doi.org/10.1134/S1061934812060214

Keywords

Analytical atomic spectrometry, Sample fractionation, Two-step probe atomization, Vapor condensation